

Interaction, Learner Styles, and Content in Online Courses: Implications for Teacher Preparation

Jay Wilson
University of Saskatchewan
Canada
jay.wilson@usask.ca

Peter R. Albion
University of Southern Queensland
Australia
albion@usq.edu.au

Abstract: Educators and learners at all levels are increasingly likely to find their classes going online for at least part of the time. Although good teaching exhibits some consistent characteristics regardless of environment, learning and teaching is different in online environments and educators need to be prepared to design and implement classes appropriately. This paper reports on research into online learners' preferences for interaction and considers the implications of the findings for preparing educators to work more effectively in online environments.

This paper responds to the growing need for teachers at all levels to work online by presenting research-based recommendations for preparing teachers to develop and deliver courses online.

The earliest programs of study offered on the World Wide Web appeared from about 1996 as extensions to distance education programs that had previously been offered using printed and posted materials (McLendon & Albion, 2000). Although the first online courses and programs were novel, a little more than a decade later they have become a widely accepted method of education. Indeed, by 2000-2001 it was estimated that about 90% of colleges in the USA offered distance education courses and almost 200 colleges offered online graduate degrees (Tallent-Runnels et al., 2006). A 2004 survey found that 93% of international institutions surveyed claimed either to have an online learning strategy or to have one under development (Inglis, 2007).

Reasons for the growing popularity of online education vary according to context but are mostly related to making education more accessible. The original impetus for online programs was to extend the variety of interaction available in distance education courses and to add opportunities for interaction among learners unable to meet in person (McLendon & Albion, 2000). However, not all learners opting to study online are geographically distant from the campus. Learners with established careers or families, or who are unable to attend on-campus courses, benefit from the opportunity to study online (Bocchi, Eastman, & Swift, 2004). Where we could once have assumed that those not attending class were distance students, that is no longer the case and web-based lecture technologies are blurring the boundaries between on-campus and distance (Woo et al., 2008). Blended learning courses are being used to expand the learning community beyond the boundaries of time and space imposed by the regular timetable and classroom (Lord & Lomicka, 2008).

Although online education began in the tertiary education sector, it is now becoming a feature of the school sector too. For example, the Brisbane School of Distance Education (<http://www.brisbanesde.eq.edu.au/>) and the Florida Virtual School (<http://www.flvs.net/>) have adopted technologies, such as learning management systems, first developed for use in universities and offer complete subjects and programs of study online. Moreover schools are adopting blended approaches in which online components are used to enrich regular classes. The advent of open source learning management systems such as Moodle (<http://moodle.org/>) has lowered the cost of adoption and accelerated this trend.

Human interaction in online environments is different than in face to face classes, not least because as much as 65% of the meaning in typical conversations is conveyed using nonverbal components (Mohan, 2004). Although the same principles of effective learning and teaching apply in online environments as in regular classes, there are differences in how they are expressed. Hence teachers need specific preparation for working in online environments and that preparation should be based upon research into what works best for online learning and teaching. This paper distills some lessons for teacher preparation based on research into online learners' preferences

for different forms of interaction according to their learning preferences or styles, and the nature of the course content (Wilson, 2008).

Literature review

A broad survey of the online education literature was prompted by the first author's observation that, an active and engaged learner in a regular classroom, he had sometimes experienced learning online as isolating despite the literature emphasizing the importance of interaction (Wilson, 2008). Among the several themes that emerged from the review, three were selected for investigation in the study: interaction, learner styles, and course content.

Interaction

Among the themes identified in the literature, interaction was mentioned most frequently as having the greatest effect on learner success. Interaction is widely recognized as important to educational design and is linked to the concept of transactional distance (Moore, 1993) which conceptualizes the distance in distance education as not merely a matter of geographic separation but a pedagogical variable addressing the psychological and communications space that separates learner and teacher. Given the demographic shift described above, this broadening of the idea of distance in education is apposite. Compared to earlier forms of distance education, online education increases the variety of methods of interaction available (McLendon & Albion, 2000) to reduce transactional distance and thereby improve communication and learning.

Moore (1989) distinguished three forms of interaction, namely learner with content, learner with instructor and learner with learner. Learner experience is affected by each of these forms of interaction and by interaction with the interface and other aspects of the technologies used to support interaction (Anderson, 2003). Numerous studies have examined interaction in online education and have typically reported that interaction is important for learner satisfaction and success (Wilson, 2008).

There is still much to be learned about how best to arrange interaction to meet the needs of learners in particular online courses. This study attempted to build knowledge about learner preferences for interaction in relation to their general learning preferences and the nature of the content in the courses.

Learner styles

A recurring theme in the literature was the effect of learner preferences on student satisfaction and success with online courses. Most often learner preferences are described in terms of learner, or learning, styles but other terms are used and there are numerous different models referred to in the literature. An overview of theories, models and measures (Cassidy, 2004) cites sources identifying more than 30 labels used to describe a variety of cognitive and learning styles. Hence one challenge for researchers in this area is to select an appropriate instrument for investigating learner preferences.

Logan and Thomas (2002) studied the learning styles of 46 students enrolled in an online computing course at the UK Open University using the Honey and Mumford Learning Styles Questionnaire (HMLSQ) and the Grasha-Reichman Student Learning Style Scale (GRSLSS). They identified two groups of students, one with a preference for learning independently and the other with a collaborative/participant orientation. Students with these different orientations respond differently to opportunities for interaction in online courses and the needs of both sets should be addressed.

Diaz and Cartnal (1999) compared learning styles of two groups of students studying health education using the GRSLSS. They found that the online students were more independent and the classroom students more dependent in their learning styles. Online students appeared to be driven more by intrinsic motivation than by the reward structure of the class. A recent study of 48 college students using two web-based study conditions found that students in their less-preferred study condition recorded decreased achievement relative to those in their preferred study condition (Johnson, 2007). Thus there is evidence for the value of accommodating learner preferences in course design but further research is needed into how learner preferences align with various aspects of course design.

Content

Learners with different styles might prefer to work in different ways with particular types of content. For example, certain skills might be best learned through individual practice but more conceptual material might be

better handled through discussion with peers. Hence it is possible to conceive of a typology of course design in which type of content might be a factor (Albion & Ertmer, 2004). However, there appears to have been little research published about the relationship of content to course design and consequent outcomes for learners.

Much of the limited research dealing with content in online courses has been based on analysis of discussion transcripts. Christopher, Thomas and Tallent-Runnels (2004) studied interactions among 10 students in a graduate course that met a few times face to face and then relied upon online discussions. They rated student contributions in three categories – low, medium or high – and reported that the majority of responses fell in the medium category – application and analysis. However, they found no relationship between the level of the prompts provided by the instructor and the average levels of responses.

Murphy and Coleman (2004) studied use of discussion boards by 20 students enrolled online in a Master of Information Technology program. They observed that students experienced challenges similar to those reported in the literature a decade previously. Scaffolding, modeling good practice, and targeting of specific cognitive processes were suggested as strategies for improving the quality of the online learning experience.

Other studies have reported that learners restrict themselves to required postings to discussion groups unless they are motivated to do more. Motivation to engage in discussion can be influenced by the instructor, connections made with peers, and by the content of the discussion occurring in the course (Stepich, Ertmer, & Lane, 2001; Weaver, 2005). Research into relationships among course content, learner styles and interaction design has potential to inform better design and implementation of online courses.

Research questions

The focus question for the study on which this paper is based was: How do learning styles, course content, and interaction come together to impact satisfaction and outcomes for online students? Four sub-questions provided guidance for data collection and analysis. They were:

1. What is the relationship between learning styles and amount of interaction experienced by students?
2. What is the relationship between course content and specific types of online interaction?
3. What is the relationship between online interaction and student satisfaction?
4. What is the relationship between learning styles, course content, interaction, and student outcomes?

This paper reports implications for preparation of teachers at all levels to work in online educational environments.

Methodology

The initial phase of data collection used an online survey comprising 125 questions in six sections: Course Content, Learning Styles, Interaction, Course Outcomes and Satisfaction, Background Information, and an invitation to a follow-up interview. Validity of the survey was addressed by using published instruments where possible and by seeking feedback during development from a panel of six members with expertise spanning online education, research design and statistics, and online survey construction. The final instrument included items from the GRSLS together with items about frequency of working with course content categorized according to Bloom's taxonomy, items about interaction in the course based on Moore's (1989) typology, and items about satisfaction and outcomes together with some simple demographics. Responses used five point scales ranging from strongly disagree to strongly agree for items requiring an attitudinal response or from never to frequently for those requiring a response about an activity.

Invitations to participate were sent to 477 students taking online courses in Education at two universities, one in Australia and one in Canada. Completed surveys were received from 124 participants in 23 countries. Follow-up interviews were conducted with 10 volunteers to validate and elucidate survey findings.

Results

The results presented here have been selected from the full study (Wilson, 2008) for their relevance to preparation of teachers to design and teach in online courses.

Interaction

Patterns of interaction for individual participants showed significant correlation ($p < 0.01$) among the sub-scales (content, instructor, and peers). That is, learners active in one mode of interaction were likely to be active in

the other modes as well. However, it was evident that most recorded low levels of interaction with instructor and peers, and that it was content that was the target of most activity contributing to high levels of interaction. Further analysis using ANOVA revealed significant relationships between learners reporting high interaction with content and course activities entailing demonstrating, applying and analyzing.

Significant correlations were found between learner satisfaction with their courses and their levels of interaction with instructor ($p < 0.05$), content ($p < 0.01$) and peers ($p < 0.01$). No significant relationship was found between interaction and course grades.

Data collected at interview confirmed that interaction was highly valued in online courses for its contribution to understanding. Students noted the need for time to get to know the other learners as a basis for positive interaction and for interaction to contribute to achievement of course learning goals rather than be an end in itself. They preferred having flexibility to adjust levels of interaction according to personal needs, which varied from time to time depending upon other commitments. This desire for flexibility contributed to their preference for asynchronous rather than synchronous interaction for most purposes.

Learning styles

Table 1 summarizes data from the GRSLS showing mean scores on each of the six sub-scales and the distribution of participants grouped into low, moderate and high on each of the sub-scales. The highest mean score and largest proportion recording high scores was for the Independent style with Participant style a close second. Collaborative and Dependent styles were also strongly represented but Avoidant and Competitive styles had low mean scores and few participants who scored high on either.

Learning style	Mean	Low (%)	Moderate (%)	High (%)
Independent	3.8	2.4	15.3	82.3
Avoidant	2.4	66.9	29.8	3.2
Collaborative	3.6	13.7	18.5	67.7
Dependent	3.5	8.1	29.8	62.1
Competitive	2.2	68.5	25.8	5.6
Participant	3.7	5.6	15.3	79.0

Table 1: Learning style mean scores and distributions

Significant correlations were found for three pairs of styles: Collaborative/Participant ($p < 0.01$), Dependent/Competitive ($p < 0.01$), and Collaborative/Dependent ($p < 0.05$). This may be explained by each of these styles requiring some level of interaction with peers to be effective. An ANOVA conducted with overall interaction split into high, moderate and low groups found significant relationships ($p < 0.01$) for interaction with Collaborative and Participant styles, confirming that learners who score high on these styles are most likely to seek higher levels of interaction.

On interview it was apparent that participants understood how they fit in online courses. They described themselves using terms like “*constructivist learner*” or “*lone learner*” and one commented, “*I am a collaborative person. That’s why I like online learning so much.*” All agreed that having traits associated with the Independent style is important for success in online study. One said, “*You have to take charge of your own learning and make meaning of it, often on your own.*” Another commented, “*You need self discipline. There is only you.*”

Course content

Table 2 reports the mean scores recorded for frequency (never = 1 to frequently = 5) of activities engaged in with course content. The categories are based on Bloom’s taxonomy. As might be expected for graduate courses, activities requiring recall (memorize) were infrequent but the spread across the remaining categories is reasonably even. As noted above under *interaction*, learners reporting high interaction were significantly more likely to report high scores for demonstrating, applying and analyzing.

	Memorize	Demonstrate	Apply	Analyze	Combine	Recommend
Mean score	2.5	4.4	4.0	4.1	3.8	4.0

Table 2: Mean scores for frequency of course activities with content

Interviews revealed that the content of most courses could be described broadly as constructivist. Most learners reported engaging in common online activities such as reading prescribed material and posting comments in discussion boards. The requirement to post where peers could read it motivated learners to research thoroughly and spend time drafting postings rather than responding in haste. They noted that they needed time to adjust to the new environment, develop relationships of trust with peers, and develop writing skills to facilitate clear communication. Most had preferred activities and many nominated discussion forums because of the opportunities for interaction with other learners and for refining understanding through such exchanges of ideas, especially when that allowed them to apply what they had learned and see it fit with the bigger picture. One said that his favorite approach was teaching content to others because it honed his understanding through the processes of preparing, moderating and discussing a chosen topic.

Most interviewees also reported a system for progressing through the modules or classes. The process would involve reviewing the content, reviewing assignments, and then planning time appropriately. Printing off and then reading content was a popular approach. Several reported that they liked to get the content and get away from the computer. One stated that she liked to “...go somewhere quiet and go through the readings.”

Course design

Various elements of the data provided insights into participants' views about course design. Table 3 presents the percentages of participants agreeing (moderately or strongly) with several items from the GRSLS that have a direct bearing on course design. High levels of agreement with items from both the Dependent and Independent sub-scales suggests an element of ambivalence among learners who require a degree of independence to succeed with online learning but display a degree of dependence in their desire for clear guidance about what they must do to succeed.

Questionnaire item	Sub-scale	Agreement
I want teachers to state exactly what they expect from students	Dependent	92.5%
I want clear and detailed instructions on how to complete assignments	Dependent	88.4%
I complete assignments the way my teachers tell me to do them	Dependent	90.1%
I want teachers to have outlines or notes available to me	Dependent	87.4%
If I like a topic, I try to find out more about it on my own	Independent	90.9%
When I don't understand something, I first try to figure it out for myself	Independent	99.2%
I am willing to help other students when they do not understand something	Collaborative	94.2%

Table 3: Strong responses to questions about courses from the learner style scale

Participants in graduate courses are typically already busy in their professional and personal lives. The items identified in Table 3 as reflecting a Dependent style are consistent with a preference for courses with a clear focus. This was confirmed on interview. A comment from one interviewee reflected a degree of dependence on direction from the course designer: “*There was a lot of information that was not relevant to me in my studies and a lot of information that I didn't understand why it related to my course.*” Another reflected a mix of dependence on the instructor for direction with an element of independence in a desire for valuing of learner contributions: “*I prefer something useful. As a teacher I do my best to ensure I do what I can for each individual student. The course never asked what I knew, what I have done, could/can do, or what do I need or expect, but instead told me that students are not to give their own ideas. So much for free thinking in education.*”

Learners appreciated instructors who made an effort to engage in discussion and to provide guidance and moderation when it was needed. Those who reported positive contact with their instructor appreciated the interest in their progress as learners, offering comments like, “*My instructors made me feel like I matter.*” Those who experienced an instructor who appeared not to value interaction or was unable, or unwilling, to foster it were disappointed with their experience. Most did not place high value on social interaction except for its contribution to supporting discussion directed toward learning. They acknowledged that there were opportunities for social interaction but they already had friends in the real world and most were “*focused on getting through the content.*” In general they seemed to prefer asynchronous activity because it could better accommodate their already busy schedules, which was often their reason for studying online. One interviewee commented: “*I need to access study materials in the available time pockets I get between jobs. Having to meet the requirements of being on line at certain times is the same as f2f teaching.*”

Possession of appropriate computer skills was an important factor in success as an online learner. Having a good set of skills, in the words of one participant, “...increases tolerance when faced with frustrating technical

problems.” Others noted that there were some skills specific to online learning and nominated having a strategy for searching, using e-mail, and understanding the particular learning management system. Some were concerned that instructors sometimes had to spend valuable time on basic skills instead of course content. Many gave examples of having learned new skills as a result of interactions with peers who brought those skills to a course. In general, the more online courses a participant had taken, the higher they self-rated for skills. Those with more experience of online study also tended to score higher grades, suggesting that skills and attitudes for successful online study develop with experience.

Implications for teacher preparation

Given that a beginning teacher has accumulated 15 years or more of experience as a learner in classrooms, it is not surprising that they might teach as they were taught. Most beginning online teachers have little or no experience as online learners and may find the transition difficult. Requiring some online study in teacher preparation programs would be a positive step toward preparation for online teaching. That might be as simple as offering an online orientation to teaching online but even that would require that teacher educators should understand and apply key principles for online learning and teaching. That may be the first and most challenging hurdle.

However, although experience as an online learner would be a good start, especially toward developing empathy for online learners, it is unlikely to be sufficient. Teacher candidates at all levels should have opportunities to develop understanding of the key principles for online learning and teaching. The following recommendations are offered on the basis of the findings from this study.

Interaction is important for learning and is valued by learners but it is important to be aware that many learners choose online courses for flexibility. Hence interaction should not unnecessarily restrict flexibility for learners who find synchronous interaction and frequent group work detracts from the flexibility they are seeking. Online teachers need to preserve flexibility for learners wherever possible and should take care to justify any limitations in terms of meeting learning goals. Beyond some simple introductory activities they recognize as necessary for establishing relationships, most students are not seeking structured social interaction within their courses. Interaction should be planned to have a clear connection to course goals and should not be included for its own sake. It is not necessary, and may not be beneficial, to require interaction in all three modes (content, instructor, and peers) but it may be beneficial to offer learners choices of modes. Teachers need to be prepared with awareness of the importance of interaction and the need to allow learners choices about interaction.

Learner styles provide convenient shorthand descriptors for a wide variety of individual differences that affect the ways in which learners respond to online education. Successful online learners exhibit both independence and a focus on results, which often manifests as a desire for clear guidance from the instructor about what is required. Teachers should be clear about course requirements and their relationship to learning goals, and should make those connections visible to learners. Experienced online learners are usually aware of their own styles and how to interact with other learners, but if a course is likely to include beginning online learners it can be valuable to provide optional activities through which they can learn about their own styles and about working effectively with others in the online environment. Teachers need to be prepared with an awareness of these factors and with knowledge of techniques for meeting the needs of learners with different styles.

Content of a course is central to its purpose. Learners appreciate variety in the activities through which they engage with the content. Those in this study seemed to find that learning and assessment activities that required them to demonstrate, apply and analyze course content were more likely to be associated with high levels of interaction. Teachers need to be prepared with awareness of the value of including variety and of the value of activities around content for encouraging interaction that is fruitful for learning.

In broad terms, the processes of online teaching break into design and implementation. Compared to regular classes, online courses impose stricter requirements for planning and design to be completed well in advance of the activity so as to avert problems that can arise with the technology systems. Teachers need to be aware of the need to prepare and check courses to limit the risk of students encountering problems in the absence of support.

Learners reported higher levels of satisfaction with courses that they considered well designed. Such courses exhibited a variety of activities, including some using newer technologies, and provided learners with choices, limiting required activities to those with a very clear connection to key learning goals. Learners new to online courses may benefit from opportunities for familiarization with systems, updating of computer skills, and development of self-awareness about learning styles. Unless all new learners can be guaranteed to pass through the same initial course, it may be best to make these introductory components available as modules accessible as options

from multiple courses. Because of the importance of course design in online teaching, teacher preparation should include opportunities to design and develop courses that apply these understandings.

The key to successful implementation of online teaching appears to be instructor presence. Learners place a high value upon it and the only negative reports about satisfaction related to courses in which there was limited interaction with the instructor. Experience suggests that many of the challenges, technical and other, that arise in online courses can be managed if the instructor has developed a positive relationship with students that can bridge the time required to resolve the issue. A good strategy is to develop a sense of availability by establishing 'office hours' and processes that ensure a quick turnaround on student requests. Teachers in preparation need to develop the capability to project their presence in online courses.

Online courses are already common and becoming more so. Hence it is increasingly likely that teachers at all levels will be called upon to teach courses that are offered partly or completely online. The results of this study and the implications derived from them can offer some guidance toward the preparation of teachers for working effectively in their online classes.

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